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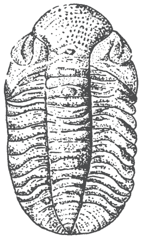
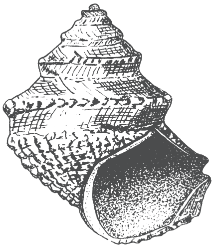
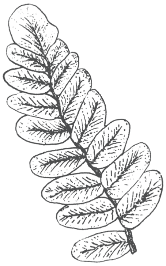




Common Fossils of Pennsylvania



COMMONWEALTH OF PENNSYLVANIA
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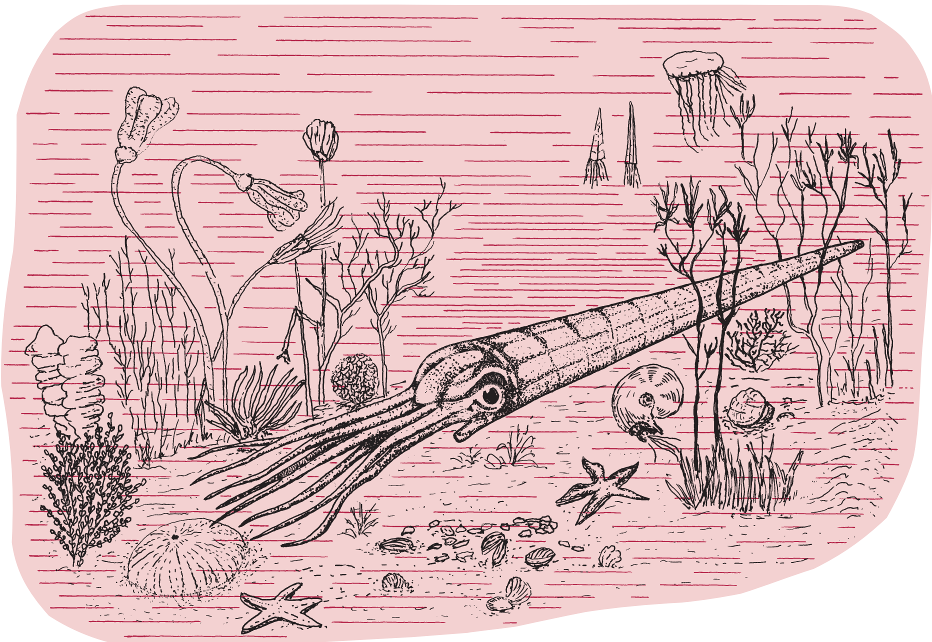
FRONT COVER: Upper left, the trilobite *Phacops rana,* which was designated the Pennsylvania state fossil in 1989; middle right, *Worthenia tabulata,* a fossil snail from near Johnstown, Pa., first described in 1835; and lower left, *Alethopteris pennsylvanicus,* a seed fern first described in, and named for, Pennsylvania in 1857. *Worthenia tabulata* is one of the first animal fossils described and illustrated by a paleontologist in the early decades of paleontologic investigations in our nation.

Educational Series 2

Common Fossils of Pennsylvania

by Donald M. Hoskins



Schematic reconstruction of life forms on and above a sea bottom in Pennsylvania during early Paleozoic time. The floating elongate, cone-shaped animal having tentacles is a mollusk of the class Cephalopoda.

PENNSYLVANIA GEOLOGICAL SURVEY

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COMMON FOSSILS OF PENNSYLVANIA

by Donald M. Hoskins

Figure 1. Fossils of dinosaurs are not common in Pennsylvania and are found only in Mesozoic-age rocks in the southeastern part of the state. Here, dinosaurs wandered near lakes and swamps, leaving tracks in the mud that later hardened to rock.

For over three quarters of the 4.5 billion years of the earth's history, cellular life has existed and has left physical or chemical evidence of its existence in rocks. Rocks in Africa and Greenland dated at 3.7 billion years old contain traces of single-celled life.

Rocks in Pennsylvania are as old as 1.6 billion years (refer to the schematic time scale on the back cover). Thus, all Pennsylvania rocks were formed after life first appeared on earth. During this long period of time, many kinds of animals, plants, and organisms belonging to other groups lived their short span and died (Figure 1). These include forms of life such as single-celled algae, which have been on the earth for over 3.5 billion years without apparent change, as well as very complex forms of life such as the vertebrates (animals having backbones), which have changed greatly as time passed, producing such subgroups as fish, birds, reptiles, amphibians, and mammals.

We know of the beginnings and changes of various kinds of animals and plants in Pennsylvania because many have been preserved as fossils.

When an animal or plant dies, various things happen to it. Most commonly, it falls to the ground or settles to the sea bottom, where it may become food for scavengers, or it gradually decays through natural processes and then disappears, leaving no evidence of its existence. Under special conditions, if an animal or plant is in just the right place at the right time, it will be naturally buried and thereby preserved. This preservation generally takes place in materials at the bottom of a lake or sea, where streams and currents bring sediment that covers the animal or plant before it is destroyed by natural processes. If tracks and trails left behind where animals have walked (Figure 2), crawled, or burrowed are similarly preserved, they too become fossils.

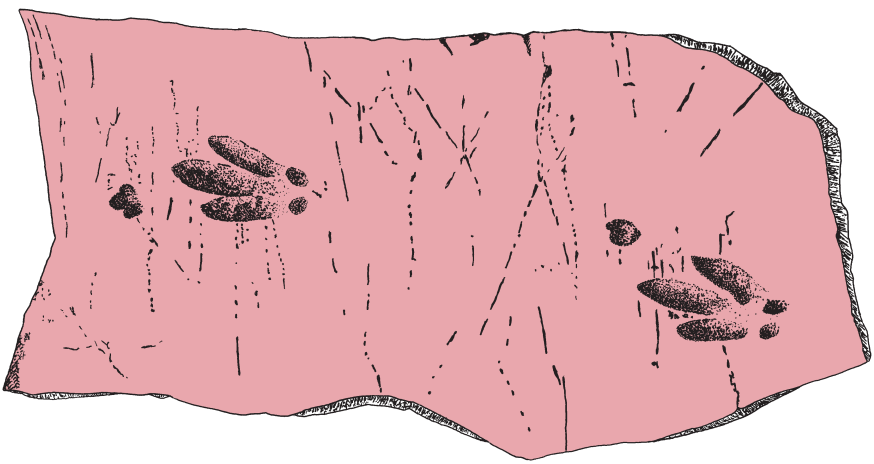


Figure 2. Sketch of a rock slab on which the footprints of a Pennsylvania dinosaur are preserved.

WHAT IS A FOSSIL?

A ***fossil*** is any natural evidence of prehistoric life that provides some idea of the size, shape, or form of the organism. A fossil need not be a whole animal or plant; broken fragments or naturally separated pieces are also fossils, as are tracks made where an organism walked, crawled, or burrowed.

Many types of organisms are rarely found complete. For example, most plants are made up of easily separated pieces such as seeds, leaves, stems, branches, and trunks. Many animals with which you may be familiar, such as starfish or mammals, have hard, bony parts held together by fleshy material; decay of the fleshy material allows the hard parts to be scattered by various natural processes.

Many animal fossils consist only of the hard parts because these are the parts that best resist decay and destruction. Snail shells and clam shells are examples. For some animals, the soft, fleshy parts are totally unknown because the animal is extinct and the hard parts we do find bear no relation to any living form.

Most of the fossils found are the remains of organisms that lived in marine waters or in lakes. This is because burial is more likely to occur in these environments, where sedimentation can preserve the organisms before they are totally destroyed. Forms of life that live on land are less commonly preserved, because on land there is less sedimentation and more rapid decay. A notable exception to this general rule occurs in Pennsylvania, where plant fossils are common. Plant fossils are found in many parts of Pennsylvania in the rocks and coal that formed in extensive swamps during the geological period of time called the Pennsylvanian Period (323 to 299 million years ago) (see back cover).

The hard parts of fossils are commonly dissolved after they have been buried in sediment, leaving an open space in their place. This space becomes a ***mold*** of the fossil (Figure 3). If the mold becomes filled with more sediment, which is then preserved in the original shape of the fossil, a ***cast*** of the fossil is formed. Many fossils are preserved only as molds and casts.

It is likely that only about one of every million living organisms has a chance of being preserved, because natural processes quickly destroy

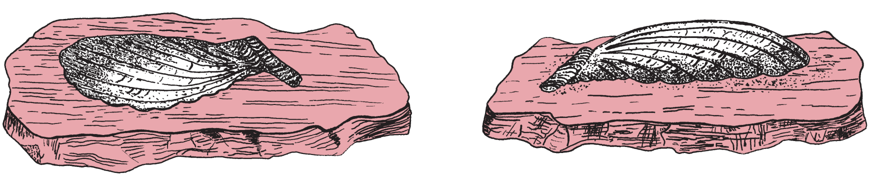


Figure 3. Sketch of a rock specimen showing a mold and cast. On the left is a depression that is a *mold* of the shell that formed the depression. On the right is a *cast* of the same shell, formed when sediment filled in the mold and was later hardened into rock. Both are fossils.

them. In addition, sites suitable for fossil preservation exist in only a few places at any one time. Thus, only a small portion of the total past life of the earth had the opportunity to become preserved as fossils. It is entirely likely that some forms of life will never be known because they were not preserved as fossils.

USES OF FOSSILS

Fossils have many practical uses. Furthermore, the collection and study of fossils, the science known as ***paleontology,*** can prove to be a rewarding and interesting professional, personal, or family activity.

First, and most important, fossils provide us with direct evidence of the types of plants and animals that have lived on the earth. Second, fossils demonstrate how these organisms evolved and changed through geologic time.

Fossils are also used to determine the climate, environment, and position of land masses and marine waters of the geologic past. We know that most plants presently live on land. From this information, we can readily assume that rocks that contain plant fossils were also formed on land. Because we also know that certain kinds of animals presently live only in marine water, finding fossils of these animals in a rock indicates that this rock was most likely formed from sediment that accumulated on a sea bottom, and that what is now land where we find the fossil was at one time at the bottom of a sea or ocean.

Fossils are also useful to scientists in their detailed studies of rocks. One of the questions that ***geologists,*** the scientists who study rocks and fossils, most often ask is whether rocks found in different locations are of the same age or of different ages. If the rocks examined by the geologist contain fossils, this question commonly can be answered. The history of life demonstrates that many of the same species of animals and plants lived at nearly the same time over large areas of the earth. Thus, if rocks in different locations contain the same species of plants or animals, geologists can generally say that they are of the same age. This practical use of fossils is called ***correlation.***

CLASSIFICATION

Because there are so many kinds of plants and animals, scientists who are concerned with their study and description have established a system of classification in which scientific names (other than the common names we often use) are assigned to every living and fossil plant and animal. The most commonly used scientific name for an animal or plant has two parts, ***genus*** and ***species.*** You may be familiar with the scientific name for humans, which is *Homo sapiens,* or the scientific name for dogs, which is *Canis familiaris.* The first name is the genus (or generic name), and the second is the species (or specific name). *Homo sapiens* refers to all humans; to refer to an individual, it is customary to use a familiar name such as Jane or John Jones. Referring to dogs, we might call an individual dog by the name Rover.

For ease of scientific study, individual organisms are grouped by shared characteristics into categories. For example, dogs are grouped into informal categories such as hound, setter, and so forth. Informal categories or individuals are grouped into species, and species are grouped into genera. As another example, the genus *Homo* includes present-day men and women, *Homo sapiens,* as well as the prehistoric humans, *Homo habilis.* Both of these species are included in the same genus because they are much alike, but they still have some measurable differences. In the same way, several different genera may be grouped into a higher category ***(class)*** because of one or more common characteristics. *Homo sapiens* belongs to the class Mammalia because humans are warm blooded, bear live children, and nurse them. All other animals that have the same characteristics, such as whales, deer, and muskrats, also belong to the class Mammalia.

Different classes of animals are further grouped together into ***phyla,*** whereas plant classes are grouped into ***divisions.*** *Homo sapiens* belong to the phylum Chordata because humans have a skeleton that includes ***vertebrae*** (a backbone). Other animals having vertebrae (fish, reptiles, and birds, for example) also belong to this phylum. Most living things with which you are familiar are further grouped into either the animal kingdom or plant kingdom; they are called either Animalia or Plantae. Three examples are given on the next page to show how organisms are classified into the various groups.

The names used to classify organisms are made up of descriptive words to which Latin or Greek endings are added. The words are commonly changed into a familiar form by dropping or changing the endings. For example, animals belonging to the phylum Brachiopoda are commonly called brachiopods. If a particular brachiopod belongs to the class Articulata, it can also be called an articulate brachiopod. The generic name is not generally used informally (except in special cases such as for dinosaurs). The specific name is never used informally, and when used, it is always combined with the generic name.

Group	Example 1 White pine tree	Example 2 Seashell	Example 3 J. Jones
Kingdom	Plantae	Animalia	Animalia
Phylum or division	Spermatophyta	Brachiopoda	Chordata
Class	Gymnospermopsida	Articulata	Mammalia
Genus	*Pinus*	*Atrypa*	*Homo*
Species	*strobus*	*reticularis*	*sapiens*

DESCRIPTIONS OF FOSSILS

Described in the remainder of this booklet are seven categories of fossil animals and some of the fossil plants that are commonly found in the rocks of Pennsylvania. Each description may include something about how the animal or plant lived and something about the parts of the organism, usually the shell or other hard parts, that are commonly preserved as fossils.

The illustrations that accompany the descriptions are all of fossils from Pennsylvania. Each was chosen because it is characteristic of the class, phylum, or plant group being described. The illustrations can be used to identify fossils that you collect. Compare the fossil you are trying to identify with these sketches. If you find a sketch that looks like your fossil, the chances are good that you will have identified the phylum, class, or plant group to which your fossil belongs. The numbers in parentheses indicate the sizes of the fossils. For example, (x4) means that a sketch is four times the actual size of the fossil.

CORALS

Corals are a group of animals that belong to the phylum Coelenterata. Most corals belong to the class Anthozoa, which is characterized by the ability to build a calcareous (composed of calcium carbonate) framework. The coral animal, called a ***polyp,*** lives on this framework. A great deal is known about corals because so many of them are living in our present oceans, where they build large calcareous reefs surrounding many subtropical or tropical islands.

The fossil corals commonly found in Pennsylvania are from extinct subgroups within the class Anthozoa. They are enough like living corals that we can assume that their polyps had nearly the same type of fleshy construction as do living coelenterates.

Anthozoan coral fossils are of two types: ***colonial corals,*** those whose polyps lived close together and participated in building one large skeleton, and ***solitary corals,*** those whose polyps lived separately and formed individual skeletons.

The colonial type, an example of which is the genus *Favosites* (Figure 4), was composed of a large number of very small animals, each of which occupied one of the partly hollow tubes, called ***corallites.*** The soft body occupied only the near-surface part of the tube; the lower part of the tube was divided by transverse plates, called ***tabulae,*** as seen in

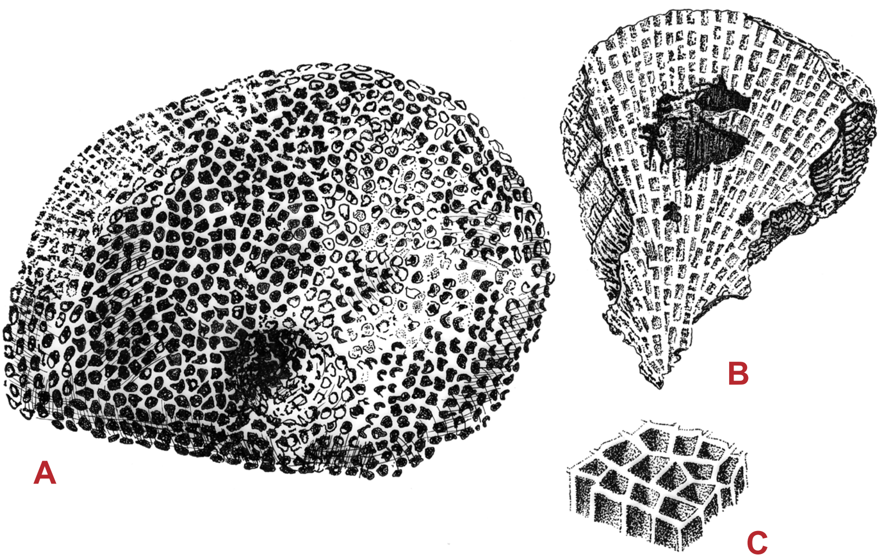


Figure 4. A. A colonial coral, genus *Favosites* (x1), in a hemispherical form about 2 inches in diameter. B. A *Favosites* specimen (x1) cut to show a cross section of the individual *corallites* crossed by transverse plates called *tabulae* on which the living *polyp* rested. C. Oblique view of an enlarged part (x4) of the upper surface of a *Favosites* colony showing the shape of the corallite into which the polyp could retract when disturbed.

Figure 4B. As the colony grew, each corallite grew longer, and periodically a new tabula was formed so that the polyp remained near the surface of the colony.

The upper part of the polyp was surrounded by tentacles that moved in the ocean currents and gathered in food. Normally, the animal extended itself outside, but when disturbed, the whole animal retracted into the corallite. The relationship of the soft parts to the hard parts of the extinct *Favosites* is deduced from the study of living corals.

The solitary type of coral, exemplified by the genus *Zaphrentis* (Figure 5), is often called a "horn" coral because of its resemblance to a horn. This type of anthozoan coral was built by nearly the same kind of animal as colonial corals, except that the polyp was much larger. Most horn corals contained many internal plates that were parallel to the long dimension. These plates are called ***septa.*** The septa of horn corals were also joined by tabulae, and it was on both tabulae and septa that the solitary coelenterate rested.

A

B

Figure 5. A. A solitary coral, genus *Zaphrentis* (x1), viewed from the side. The narrow end rested on the sea bottom, commonly buried in sediment to stabilize the coral. B. View of the cup-shaped upper surface of *Zaphrentis* (x1) showing the upper edges of *septa* to which the *polyp* was attached.

BRYOZOANS

The phylum Bryozoa includes very small colonial animals that build a plantlike or mosslike calcareous skeletal framework. They are commonly called moss animals because of this similarity.

All bryozoans are colonial. The skeletal frameworks can be lacy, plant-shaped, mound-shaped, or any of numerous other shapes. The shape of the genus *Eridotrypa* (Figure 6) is plantlike. This fossil is most often found broken apart into twig shapes or small branches. The genus *Monotrypa* (Figure 7) is most often found shaped as a ball or small mound.

Bryozoans grow as encrustations on hard surfaces or are cemented to something hard on the sea bottom and stand upright, having the appearance of seaweed. The entire surface of the calcareous framework,

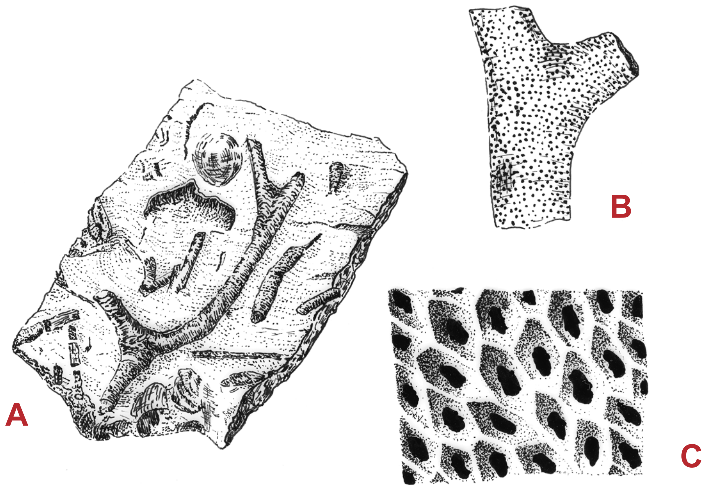


Figure 6. A. An oblique view (x1) of a surface of a rock specimen on which are preserved several branches and pieces broken from a colony of the bryozoan genus *Eridotrypa*. B. An expanded (x4) view of a small part of an *Eridotrypa* colony showing the location of *zooecia*. C. Greatly expanded view (x16) of the surface of *Eridotrypa*. The holes shown in black are the zooecia in which the animals lived.

which is called the ***zoarium,*** is covered with very small openings (Figure 6B, C), termed ***zooecia*** (***zooecium,*** singular), in which the animals live.

The soft body of a bryozoan is very small and can withdraw into the zooecium. In superficial aspect, it is similar to the soft parts of a coral because it, too, has a ring of tentacles around its upper part. The tentacles extrude from the zooecium in order for it to catch its food. The soft body, however, is much smaller and is biologically very different from that of a coral polyp.

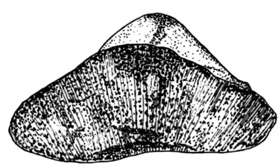


Figure 7. A mushroom-shaped colony of *Monotrypa* (x1) partially cut to show a cross section of the internal colony structure. Each line represents a *zooecium*.

BRACHIOPODS

Brachiopods belong to the phylum Brachiopoda and, together with plants, are among the most common fossils found in Pennsylvania rocks.

Brachiopods are similar in appearance to bivalves (clams). Both brachiopods and bivalves have two shells, or ***valves.*** In most bivalves, the valves are the same size and shape; they are thus mirror images of each other. The two valves of a brachiopod differ in size and shape and are not mirror images of each other.

Perhaps the easiest way to tell a bivalve from a brachiopod is to divide them into two equal parts. Figure 8A shows the front view of a bivalve shell; no line can be drawn on it that will divide it into two equal parts. However, in Figure 8B, a side view, the bivalve is separable into two equal valves, hence the name "bivalve."

The brachiopod shell is divided in half by a line as shown in Figure 8C. Figure 8D is a side view of a brachiopod, showing that it cannot be divided into equal parts by separating the valves. Thus, we say that brachiopods are ***inequivalved*** (have valves of different size) and bivalves are ***equivalved*** (have valves of the same size).

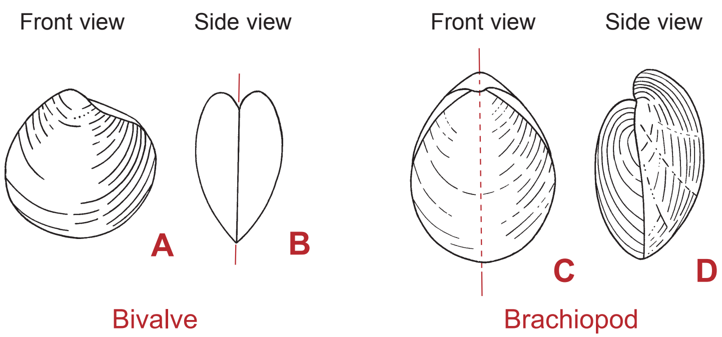


Figure 8. How to differentiate between a brachiopod and a bivalve (clam) based on the shape of their shells *(valves).*

Some brachiopods live on the sea bottom, attached to a rock or shell fragment by a fleshy stalk (Figure 9A); others rest on, or burrow into, the sea bottom. Except for the stalk, the soft parts of the animal are completely enclosed between its two valves, which are held together by strong muscles.

The most common brachiopod fossils found in Pennsylvania rocks belong to the class Articulata. The sketches of some of these fossils (Figures 9, 10, 11, and 12) show a variety of external shapes and surface ornamentation common in brachiopods found in Pennsylvania.

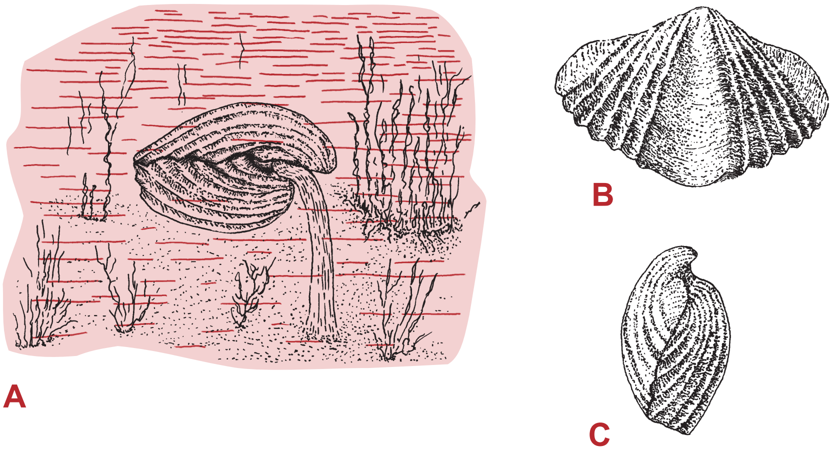
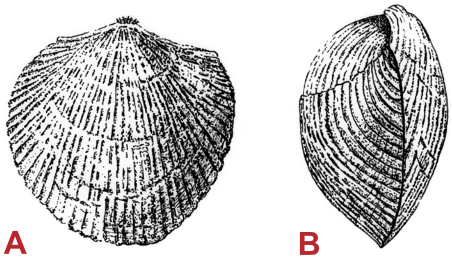


Figure 9. A. Schematic sketch of the brachiopod genus *Acrospirifer* attached to the sea bottom by a fleshy stalk (x1). B. Top view of *Acrospirifer* showing coarse ribbed ornamentation (x1). C. Side view of *Acrospirifer* showing unequal-sized valves (x1).

Figure 10. Top view of the small brachiopod genus *Ptychomaletoechia* (x2).

Figure 11. A. Top view of the medium-sized brachiopod genus *Atrypa* showing fine-ribbed ornamentation (x1). B. Side view of *Atrypa* showing unequal-sized valves (x1).



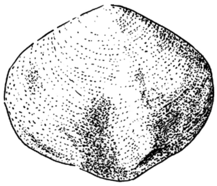


Figure 12. Top view of the brachiopod genus *Meristella,* which has no ornamentation (x1).

MOLLUSKS

Included in the phylum Mollusca are two groups of very common and well-known animals. These are the clams and snails; their scientific names are Bivalvia (or Pelecypoda) and Gastropoda. Each of these is a class within the phylum Mollusca.

Other classes of mollusk fossils are also found in Pennsylvania, although they are rarer. One class, the Cephalopoda, includes fossils of long, straight cones that housed animals having tentacles similar to those of the living octopus. A sketch of a cephalopod is included on the title page of this booklet.

Bivalves

Bivalves, or pelecypods, as they are sometimes called, are common animals found in present-day fresh and marine waters. You know them mostly as mussels, scallops, and oysters; all or parts of their bodies can be food for us. The common fossil bivalve genus *Nuculopsis* is shown in Figure 13. Bivalve fossils have many shapes, sizes, and different types of ornamentation.

Figure 13. The left valve of the bivalve genus *Nuculopsis* seen in side view (x1).

As described in the discussion of brachiopods, most bivalves possess two valves, both of which look alike; one is a mirror image of the other. This is not true of oysters, which belong to a bivalve subdivision that has evolved so that one valve is larger than the other, similar to brachiopods. However, the study of the soft body of the oyster shows that it belongs to the molluscan phylum rather than to the Brachiopoda.

Both valves of a bivalve bear a pointed part, near where they are hinged, called the ***umbo,*** or ***beak.*** The sketch of *Leiopteria* (Figure 14) clearly shows the umbo. This is the point at which a bivalve started to grow. Paralleling the outline of the valves are grooves or ridges, which are growth lines. These lines show the size of the valves at various stages in the life of a bivalve. Many valves are also marked with other lines of ornamentation, including fine and coarse ribs (Figure 15).

Figure 14. The left valve of the bivalve genus *Leiopteria* showing the pointed *umbo,* or *beak,* and parallel growth lines (x1).

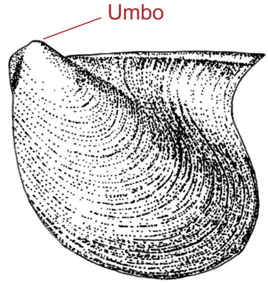


Figure 15. The right valve of the bivalve genus *Praecardium* showing the *umbo,* ribbed ornamentation, and a faint growth line (x0.4).

Within the valves lies the soft body, the major part of which consists of the strong muscles used to close the valves when the animal is disturbed, and the muscular ***foot,*** which is used for moving about and burrowing. A few bivalves (for example, the oysters) attach their shells to rocks and do not move about. Other bivalves, such as the scallops, can swim about freely by rapidly opening and closing their valves.

Gastropods

The class Gastropoda contains the animals we call snails and slugs, among others. Snails are mollusks that carry on their backs coiled, unchambered shells. Gastropod shells vary greatly in shape and size. If you have the opportunity to collect gastropod shells from the seashore, you will notice great differences among them.

The snail animal carries the shell on its back with the peaked part pointing to the rear, or to the rear and upward. It retracts itself into the shell when disturbed. Some genera possess a piece of shell that fits over the opening like a door. Snails live in nearly all earth environments, from dry land to fresh water to seawater. Those living on land have developed lungs, and those living underwater use gills to obtain oxygen.

The gastropod fossils illustrated on the next page are the smooth-shelled genus *Strobeus* (Figure 16) and the ornamented genus *Worthenia* (Figure 17 and front cover). They are both snails.

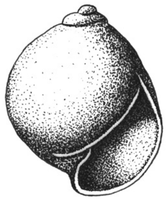


Figure 16. Sketch of the smooth shell of the gastropod genus *Strobeus* (x1).

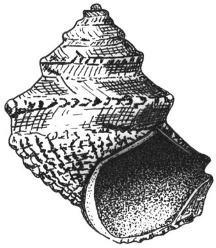


Figure 17. Sketch of the ornamented shell of the gastropod genus *Worthenia* (x1).

ARTHROPODS

The phylum Arthropoda contains those animals characterized by jointed legs and a segmented body. Included in this phylum are the class Insecta (flies and mosquitoes), the class Arachnoidea (scorpions and spiders), the class Crustacea (crabs, shrimp, and barnacles), and an extinct class, the Trilobita.

The class Trilobita contains extinct animals possessing a ***dorsal*** (upper) external covering called the exoskeleton that is divided into three primary parts: the ***cephalon,*** or head; the ***thorax,*** or body; and a rear part called the ***pygidium.*** Each of these is composed of separate, smaller segments that are fused together in the cephalon and pygidium, but are separate in the thorax. The whole exoskeleton is divided by two ***axial furrows*** into three lobes—a central lobe called the ***axial lobe*** and two side lobes called ***pleural lobes.*** From this was derived the name trilobe-ite (but spelled "trilobite"). Figure 18 indicates each named part of a trilobite.

The underside of the trilobite was not protected by a hard covering as was the dorsal surface. Appendages included walking legs, antennae, and others, all of which had a less-hard protective covering; appendages are very rarely found as fossils. An additional part of some trilobites is the ***free cheeks,*** which were attached to the two sides or undersides of the cephalon and frequently possessed a rearward-pointing spine (Figure 19).

As with living arthropods, such as crabs, the trilobites grew by ***molting*** (shedding) the exoskeleton. It was easy for the animal to shed this

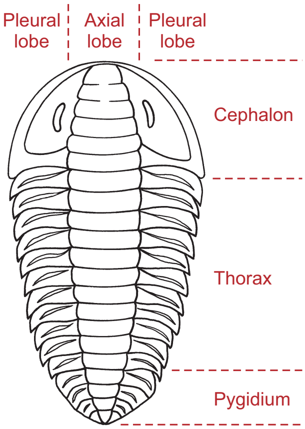


Figure 18. Schematic sketch of a trilobite showing the primary parts.

outer covering as it grew because it could come apart at the places where the segments joined. For this reason, it is common to find the various parts of a trilobite separated; it is much less common to find a complete trilobite. A single trilobite could have molted many times during its life span. After each of the molts, pieces of the exoskeleton were left lying about on the sea bottom.

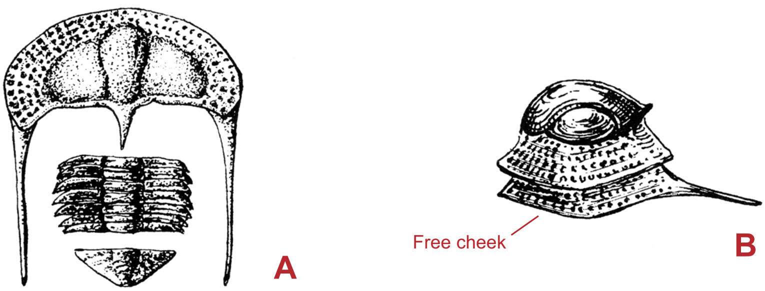


Figure 19. The trilobite genus *Cryptolithus*. A. Sketch of a specimen showing the *cephalon* (head), *thorax* (body), and *pygidium* (x4). B. Side view of the cephalon showing the *free cheeks*, which have rearward-pointing spines (x4).

Little is known about the biology of the soft parts of a trilobite because there are no living forms of this group; trilobites became extinct about 250 million years ago. A few fossil specimens have been found having antennae and legs still attached. X-ray photographs of trilobite-bearing rocks sometimes show the complete skeleton and some of the soft parts.

The official state fossil of Pennsylvania is a trilobite. It is *Phacops rana*, which is illustrated in Figure 20 and on the front cover.

Figure 20. The official state fossil of Pennsylvania is the trilobite *Phacops rana* (x1).

ECHINODERMS

The phylum Echinodermata contains those animals we know as starfish, sea urchins, and sea cucumbers. It also contains the class Crinoidea, which is very well represented in Pennsylvania by fossil specimens. Because of the fancied resemblance of crinoids to some plants, they are sometimes called sea lilies.

The skeletal part of the crinoid animal is roughly divided into three sections as illustrated in Figure 21. The stalk, or ***column,*** is attached to the sea bottom; the body, or ***calyx,*** is the part in which the soft body is housed; and the ***arms*** wave about in the water and are the food-catching mechanism. Each of these main body parts is made up of many small calcareous plates that are held together by a skinlike tissue. After the animal dies, the skin is quickly destroyed and the individual plates are scattered about on the sea bottom.

Although complete crinoids are seldom found, the pieces that make up the column, ***columnals,*** are abundant as fossils. These pieces are mostly round or star-shaped disks that fitted together to form the long column. They are commonly ridged or notched in distinct patterns on the flat sides.

The fragments that make up the calyx and arms are not often found, or are not easily recognized when they are found.

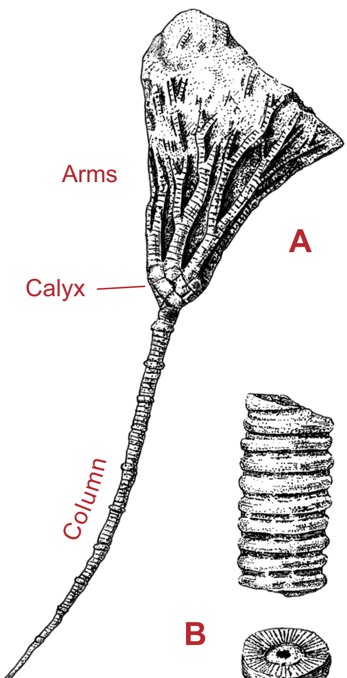


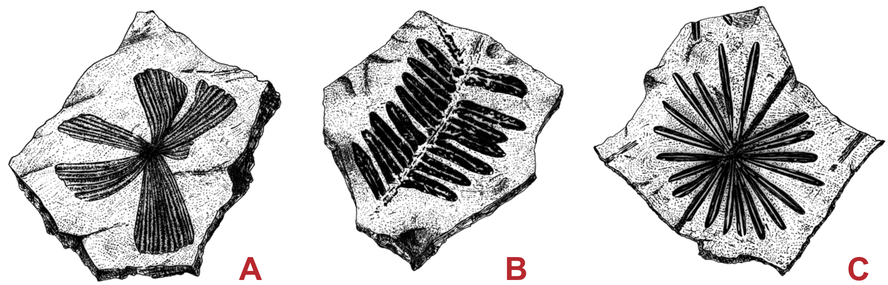
Figure 21. Crinoid genus *Cupulocrinus.* A. Side view (x1) of a complete specimen showing the three main parts. B. A part of the *column* and an oblique view of one *columnal* to show the grooved surface (x6).

PLANTS

Fragments of fossil plants are common in Pennsylvania, particularly in the anthracite and bituminous coal regions. Their association with Pennsylvania's abundant and widespread coal layers is natural because coal is a thick accumulation of fossil plant material.

The plant kingdom can be divided into two major groups, which are called ***divisions*** rather than phyla. The nonvascular plants include mosses, and the vascular plants include ferns, trees, and flowering plants. Most fossil plants belong to the vascular plant division.

The common fossil plants of Pennsylvania are illustrated in Figure 22. They come from a few general categories: scale trees, which grew to great size; scouring rushes, the fossilized leaf whorls of which are called *Annularia;* small herbaceous plants such as the rushes, the leaf whorls of which are called *Sphenophyllum;* ferns and seed ferns such as *Pecopteris* and *Neuropteris;* and trees that had wood that was probably much like that of present-day pines, but that had large leaves called *Cordaites.*



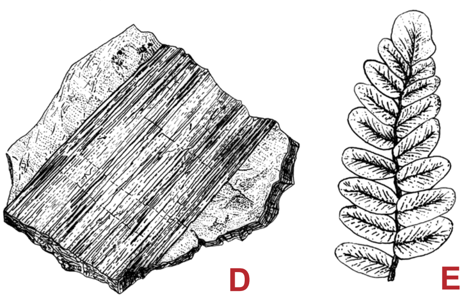


Figure 22. A. A Leaf whorl, genus *Sphenophyllum* (x2.5). B. A seed fern, genus *Pecopteris* (x1.5). C. A leaf whorl, genus *Annularia* (x0.7). D. A leaf, genus *Cordaites* (x0.7). E. A seed fern, genus *Neuropteris* (x0.5).

HOW TO OBTAIN FOSSILS

Fossils may be obtained from commercial vendors as well as by searching for them in rock exposures. The latter requires more effort but is usually more rewarding.

Privacy and safety are very important concerns when collecting fossils from rock exposures. Many of the best exposures are found along highways and roads. Persons and vehicles at these sites must at all times remain off the pavement to ensure the safety of drivers and collectors. Wearing highly visible clothing is a good rule to follow.

Other good exposures are found in pits and quarries. Operators of active mines are very strict about safety and typically require individuals to wear hard hats, safety vests, and steel-toed boots. Some may require safety training as a prelude to entering. At abandoned mines, the discarded rock in the spoil piles contains most of the fossils. Even though a mine is not active, dangers are still prevalent. One should wear the same type of safety equipment as if in an active mine.

Many fossil sites (including those in abandoned mines, pits, and quarries) are privately owned, and permission must be obtained from the property owner before visiting a site and collecting. Being a good citizen and respectful of another's property goes a long way to ensuring that fossil sites will remain accessible for future collectors.

Museums that exhibit fossils provide good information on proper and safe fossil-collecting procedures and sites, and much of it is available online. Two Pennsylvania museums with collections and educational opportunities worth checking out are the Carnegie Museum of Natural History in Pittsburgh (carnegiemnh.org/visitor/exhibitions/) and the State Museum of Pennsylvania in Harrisburg (statemuseumpa.org/exhibits/permanent-exhibits/). Some museums, such as the Paleontological Research Institute in New York State (priweb.org), conduct fossil-collecting field trips led by experts who assist in the identification of collected specimens.

There are also social organizations that periodically go on field trips to different parts of Pennsylvania to collect fossils (as well as minerals). Clubs are a great way to learn more about fossils and to meet others who share your enthusiasm. A listing of many of these organizations can be found at pennminerals.com/club.

Material on fossil collecting may also be found by doing Internet searches for related published literature and web pages. The Pennsylvania Department of Conservation and Natural Resources has a geologic education page on the topic of collecting that includes 21 plates of Pennsylvania fossil sketches at dcnr.pa.gov/Education/GeologyEducation/IdentifyingandCollecting/Pages/default.aspx. Visit this page and use the sketches to help identify fossils you find while exploring outdoors.

The author hopes that this booklet has aroused your interest and that it will encourage you to proceed further into the study of paleontology and to venture out into the field to collect the many different kinds of fossils available in Pennsylvania.

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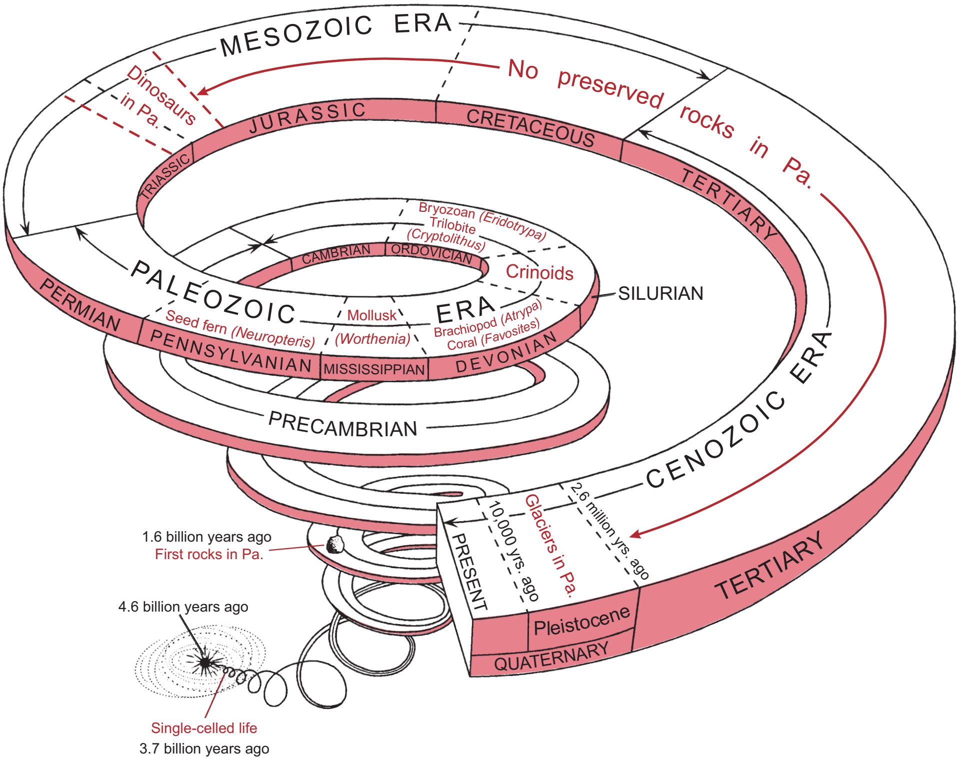

Schematic time scale showing the occurrence in geologic time of common Pennsylvania fossils described in this booklet. Based on a design by John R. Stacy, U.S. Geological Survey.